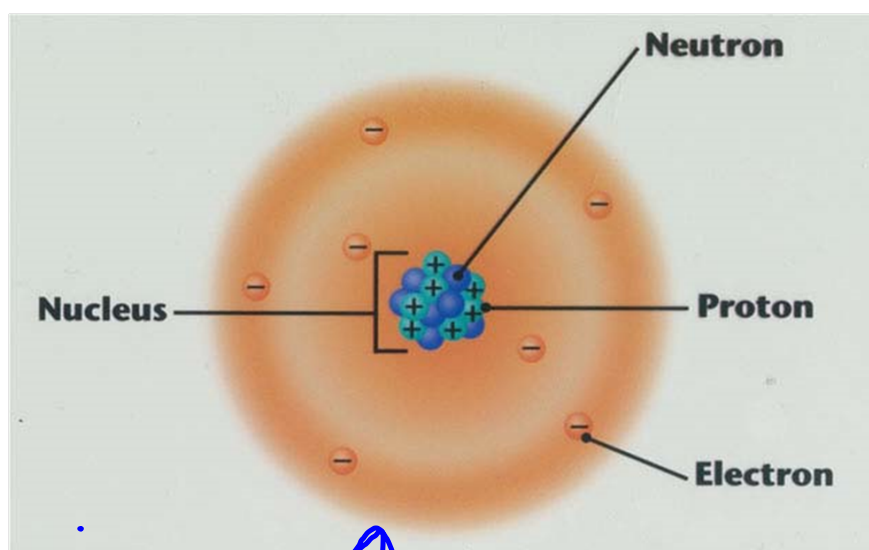
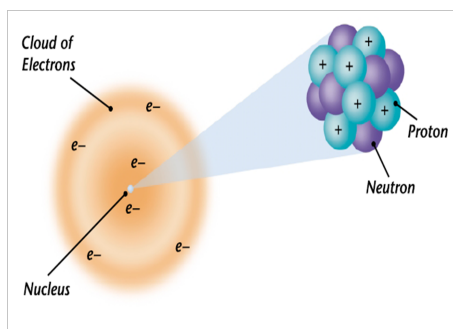


The Atom [Atomic Structure]

- The smallest part of an element that retains the element's properties
- Basic building blocks of all matter
- 3 parts to an atom:
 - Protons
 - Neutrons
 - Electrons



↑
Electron cloud

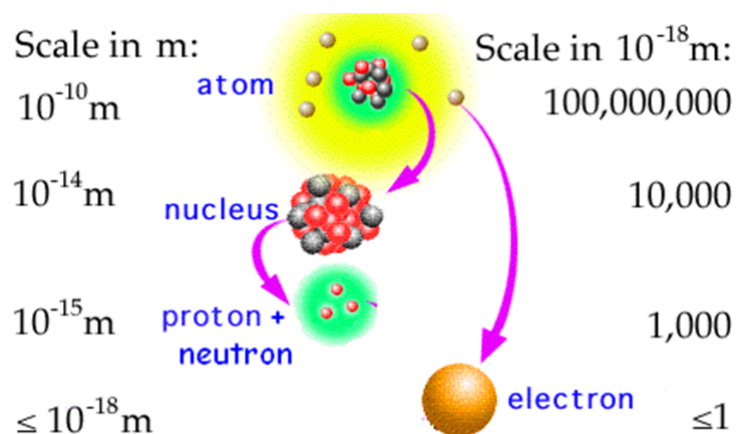


- Nucleus
 - Positively charged
 - Protons and neutrons
 - Protons → positively charged
 - Neutrons → neutrally charged (no charge)
 - Quarks make up both protons and neutrons
- Electrons
 - Negatively charged
 - Occupy the electron cloud, which surrounds the nucleus
 - Electron cloud is arranged in "shells" or "orbitals"
 - Electrons do NOT move in perfect orbitals → movement is actually unpredictable
 - Cloud gives approximate location of electrons

	Location	Charge	Mass	Special Fact
Protons	Nucleus	Positive (+)	1 amu Same as neutron	Number of protons determines the identity of the element
Neutrons	Nucleus	Neutral	1 amu Same as proton	
Electrons	Electron Cloud	Negative (-)	0.00054 amu (1/2000th mass of a proton or neutron)	Electron cloud takes up 99.999999% of the volume of the atom

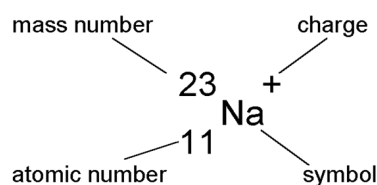
amu = atomic mass unit

total charge of atom = protons + electrons



molybdenum	← element name
42	← atomic number number of protons
Mo	← atomic symbol
95.94	← atomic mass (this is an average mass)




2	← atomic number
He	← atomic symbol
4.00260	← average atomic mass



- Another way to write atoms:

- Mass number = # protons + # neutrons

- Atomic number → tells you what element the atom is

Atomic Number		
All atoms of a given element have the same number of protons		
Nitrogen	Hydrogen	Potassium
		
7	1	19

- Each element has its own atomic number \rightarrow comes from # protons
- It is really difficult to change number of protons
- In a NEUTRAL atom, atomic number is = number of electrons (# protons)

mass number \rightarrow	35	37
atomic number \rightarrow	17	17
	Cl	Cl
	75.77%	24.23%
	Stable	Stable

• Isotopes

- Atoms that have the same number of protons but different number of neutrons
- Left: #neutrons = mass # - atomic #

$$= 35 - 17$$

$$= 18$$
- Right: #neutrons = 37 - 17

$$= 20$$

• Relative (Average) Atomic Mass

$$\begin{aligned} \text{average mass} &= (35)(.7577) + (37)(.2423) \\ &= 26.5195 + 8.9651 \\ &= 35.485 \end{aligned}$$

~~~~~ on the periodic table